

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (currently amended): A high plasma density etch process for etching an oxygen-containing layer overlying a non-oxygen containing layer on a workpiece in a plasma reactor chamber, said process comprising:

providing a chamber ceiling overlying said workpiece and comprising a semiconductor material;

supplying into said chamber a process gas comprising etchant precursor species, and polymer precursor species ~~and~~ hydrogen;

providing a plasma source power applicator [for applying a plasma source power into said chamber]; ~~and~~

supplying RF plasma source power to said plasma source power applicator so as to apply plasma source power into said chamber; and

cooling said ceiling to a temperature sufficiently low to promote polymer deposition thereon.

Claim 2 (original): The process of Claim 1 wherein said etchant and polymer precursor species contain fluorine, and wherein said chamber ceiling semiconductor material comprises a fluorine scavenger precursor material.

Claim 3 (original): The process of Claim 2 wherein said process gas comprises at least one of CHF_3 and CH_2F_2

Claim 4 (original): The process of Claim 3 wherein said process gas further comprises a non-hydrogen containing etchant and polymer precursor gas.

Claim 5 (original): The process of Claim 4 wherein said non-hydrogen containing etchant and polymer precursor gas comprises C_2F_6 .

Claim 6 (original): The process of Claim 3 wherein said process gas further comprises a species including an inert gas.

Claim 7 (currently amended): The process of Claim 6 wherein said species including an inert gas comprises one of HeH_2 , He or Ar.

Claim 8 (original): The process of Claim 2 wherein providing said plasma source power applicator comprises providing an inductive antenna overlying said ceiling, whereby said ceiling is a window to said inductive antenna, said process further comprising:
applying RF bias power to said workpiece; and
controlling an RF potential of said ceiling.

Claim 9 (original): The process of Claim 8 wherein controlling the RF potential of said ceiling comprises one of:

- (a) holding said ceiling at an RF ground potential;
- (b) applying an RF bias signal to said ceiling.

Claim 10 (original): The process of Claim 8 further

comprising:

providing a fluorine scavenger precursor material in said chamber separate from said ceiling; and

heating said fluorine scavenger precursor material to an elevated temperature above a condensation temperature of a polymer formable from said polymer precursor species of said process gas.

Claim 11 (original): The process of Claim 10 wherein said elevated temperature is above 170 degrees C.

Claim 12 (original): The process of Claim 10 wherein said elevated temperature is above 270 degrees C.

Claim 13 (original): The process of Claim 10 wherein said elevated temperature is near 350 degrees C.

Claim 14 (original): The process of Claim 10 wherein said heated fluorine scavenger precursor material comprises a semiconductor ring concentric with and adjacent said workpiece.

Claim 15 (original): The process of Claim 10 wherein said heated fluorine scavenger precursor material comprises an interior semiconductor liner adjacent a wall of said chamber.

Claim 16 (original): The process of Claim 1 further comprising providing a cooling apparatus over said ceiling for carrying out the cooling of said ceiling.

Claim 17 (original): The process of Claim 16 wherein

cooling said ceiling comprises:

using plural external semiconductor rings overlying and contacting said ceiling; and

using a chilled plate overlying and contacting said plural external semiconductor rings, wherein applying a plasma source power comprises using inductive elements overlying said ceiling between ones of said plural semiconductor rings.

Claim 18 (original): The process of Claim 17 wherein said inductive elements comprise solenoidal elements.

Claim 19 (original): The process of Claim 17 wherein said inductive elements comprise coil windings.

Claim 20 (currently amended): The process of Claim 1 further comprising maintaining said chamber at a pressure between about ~~15 mT~~ 15 mTorr and ~~115 M⁺~~ 115 mTorr.

Claim 21 (currently amended): The process of Claim 1 wherein [applying plasma source power] providing a plasma source power applicator comprises:

providing plural respective inductive elements at respective radial locations overlying said ceiling; and wherein supplying RF plasma source power to said plasma source power applicator comprises:

applying different plasma RF source power levels to said respective inductive elements to optimize etch uniformity across said workpiece.

Claim 22 (original): The process of Claim 21 further comprising providing a cooling apparatus over said ceiling

for carrying out the cooling of said ceiling, comprising:

providing plural external semiconductor rings overlying and contacting said ceiling; and

providing a chilled plate overlying and contacting said plural external semiconductor rings, wherein said respective inductive elements are provided so as to overlie said ceiling between adjacent ones of said plural semiconductor rings.

Claim 23 (currently amended): A high plasma density etch process for etching an oxygen-containing layer overlying a non-oxygen containing layer on a workpiece in a plasma reactor chamber, the process comprising:

providing a chamber ceiling overlying the workpiece and comprising a semiconductor material;

supplying into the chamber a process gas comprising etchant precursor species, and polymer precursor species ~~and hydrogen~~;

applying a plasma source power into the chamber; and

providing the chamber with at least two separate sources of fluorine scavenging material, wherein providing the at least two separate source of fluorine scavenging material comprises providing at least two of: a) a semiconductor ceiling, b) a semiconductor wall, and c) a semiconductor ring; and

cooling one of the at least two separate sources of fluorine scavenging material sufficiently [low] to promote polymer deposition thereon while heating an other of the at least two separate sources of ~~fluorine~~ fluorine scavenging material sufficiently to inhibit polymer deposition thereon.

Claim 24 (canceled)

Claim 25 (currently amended): The process of Claim [24] 23 wherein providing the reactor chamber with at least two separate sources of fluorine scavenging material comprises providing a material comprising at least one of:
a) silicon or b) carbon.

Claim 26 (currently amended): The process of Claim 23 wherein cooling one of the at least two separate sources of fluorine scavenging material further comprises cooling the one of the at least two separate sources of fluorine scavenging material to within a temperature range sufficiently [low] to promote polymer deposition thereon so as to reduce polymer deposition on the workpiece.

Claim 27 (currently amended): The process of Claim 1 wherein [providing] applying plasma source power comprises inductively coupling source power into said chamber.

Claim 28 (original): The process of Claim 27 wherein inductively coupling source power into said chamber comprises coupling power through said chamber ceiling.

Claim 29 (currently amended): The process of Claim 28 wherein providing a chamber ceiling comprises providing a silicon-comprising ceiling [said ceiling comprising silicon].

Claim 30 (currently amended): The process of Claim 27 wherein [inductively coupling source power into said chamber] said plasma source power applicator comprises

[using] a coil antenna.

Claim 31 (currently amended): The process of Claim 30 wherein inductively coupling source power into said chamber comprises coupling power through a silicon-comprising member.

Claim 32 (currently amended): The process of Claim 1 wherein providing a chamber ceiling comprises providing [said ceiling comprising substantially semiconductor material] a silicon-comprising ceiling.

Claim 33 (original): The process of Claim 1 further comprising providing at least one of a semiconductor wall or a semiconductor ring.

Claim 34 (currently amended): The process of Claim 33 wherein providing a chamber ceiling comprising a semiconductor material and providing at least one of a semiconductor wall or a semiconductor ring comprises providing members containing at least one of silicon or carbon.

Claim 35 (currently amended): The process of Claim 1 further comprising substantially enclosing said chamber with a silicon-comprising material.

Claim 36 (original): The process of Claim 35 further comprising substantially enclosing said chamber with a semiconductor material comprising at least one of silicon or silicon carbide.

Claim 37 (original): The process of Claim 1 wherein said cooling comprises cooling said ceiling to a temperature range at or below about 150 degrees.

Claim 38 (original): The process of Claim 37 wherein said cooling comprises cooling said ceiling to a temperature range at or below about 100 degrees.

Claim 39 (currently amended): An etch process for etching an oxygen-containing layer overlying a non-oxygen containing layer on a workpiece in a plasma reactor chamber, said process comprising:

- providing a chamber ceiling overlying said workpiece and comprising a semiconductor material;

- supplying into said chamber a process gas comprising etchant precursor species, and polymer precursor species ~~and hydrogen~~;

- providing inductively coupled plasma source ~~power~~ power into said chamber; and

- maintaining a temperature of said semiconductor material within a range sufficiently low to promote polymer deposition thereon.